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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/696,447	10/29/2003	Christopher C. Beatty	100204750-1	6005

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FORT COLLINS, CO 80527-2400

EXAMINER
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CHUO, TONY SHENG HSIANG

ART UNIT	PAPER NUMBER
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1795

NOTIFICATION DATE	DELIVERY MODE
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07/08/2008

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<b>Office Action Summary</b>	<b>Application No.</b> 10/696,447	<b>Applicant(s)</b> BEATTY ET AL.	
	<b>Examiner</b> Tony Chuo	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 17 March 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 24-33,35-41,49 and 50 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 24-33,35-41,49 and 50 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Amendment***

1. Claims 24-33, 35-41, 49, and 50 are currently pending. Claims 1-23, 34, and 42-48 have been cancelled. The amended claims do overcome the previously stated 103 rejections. However, upon further consideration, claims 24-33, 35-41, 49, and 50 are rejected under the following new 102 and 103 rejections. This action is made FINAL as necessitated by the amendment.

### ***Claim Rejections - 35 USC § 102/103***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 49 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Okada et al (US 4943496).

The Okada reference discloses a molten carbonate fuel cell comprising: an anode electrode operatively disposed in the fuel cell; and an electrolyte in

electrochemical contact with the anode electrode; wherein the anode electrode includes a film consisting essentially of a metal oxide established on a porous plate "35" (substrate) and an organic binder such as polyvinyl alcohol (water soluble polymer) (See column 3, line 27 to column 4, line 68 and Example 4).

Examiner's note: It is noted that the instant claim is being construed as product-by-process and that the product itself does not depend on the process of making it. Accordingly, in a product-by-process claim, the patentability of a product does not depend on its method of production. In that, it is further noted that the product in the instant claim is the same as or obvious over the product of the prior art. Therefore, the claim is anticipated by Okada et al. However, if the claim is not anticipated, the claim is obvious as it has been held similar products claimed in product-by-process limitations are obvious (In re Brown 173 USPQ 685 and In re Fessman 180 USPQ 324, See MPEP 2113: Product-by-Process claims).

In addition, the pores of the porous plate (anode electrode) are construed as cracks in the electrode that inherently enhance the surface area of the electrode for one or more catalytic reactions in the fuel cell. On the microscopic level, a pore is construed as being equivalent to a crack.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 24-29, 32, 33, 35-41, and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et al (US 2003/0012995) in view of Hata et al (US 6902790).

The Hara reference discloses a solid oxide fuel cell comprising: an air electrode layer "2a" operatively disposed in the fuel cell; and an electrolyte layer "3" in electrochemical contact with the air electrode layer; wherein the air electrode layer includes a lanthanum strontium manganese composite oxide established on a single crystal silicon substrate "4" by a liquid phase deposition method (See Figure 7A and paragraphs [0058]). It also discloses a lanthanum strontium manganese composite oxide film that has a thickness of 0.5  $\mu\text{m}$  (See paragraph [0079]). It also discloses conducting a power generation test on the fuel cell which inherently comprises the step of operatively connecting the fuel cell to an electrical load (See paragraph [0089]).

Examiner's note: It is well known in the art that the air electrode in a solid oxide fuel cell is porous. For example, Hara et al discloses a SOFC comprising a porous air electrode "12" (See paragraph [0007]). Therefore, the pores of the air electrode layer are construed as microscopic cracks that enhance the surface area of the layer for one or more catalytic reactions in the fuel cell.

However, Hara et al does not expressly teach a water soluble polymer that is at least one of polyvinyl alcohol, starches, hydrocolloids, cellulose ethers, polyethylene oxides, polyacrylates, polyacrylamides, polyamines, polyimines, or mixtures thereof. The Hata reference discloses a ceramic sheet (electrode) that contains an organic

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binder such as acrylate-based or methacrylate based copolymers, vinyl alcohol based resins, or cellulose (See column 12, line 62 to column 13, line 27). It also discloses a proportion of the binder to the ceramic material that is preferably 5 to 30 parts by weight (See column 13, lines 61-62).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Hara electrode layer to include a water soluble polymer that is at least one of polyvinyl alcohol, cellulose ethers, polyacrylates, or mixtures thereof in order to increase the strength and flexibility of the electrode layer.

Examiner's note: It is noted that the instant claims are being construed as product-by-process and that the product itself does not depend on the process of making it. Accordingly, in a product-by-process claim, the patentability of a product does not depend on its method of production. In that, it is further noted that the product in the instant claims is the same as or obvious over the product of the prior art.

However, if the claims are not anticipated, the claims are obvious as it has been held similar products claimed in product-by-process limitations are obvious (In re Brown 173 USPQ 685 and In re Fessman 180 USPQ 324, See MPEP 2113: Product-by-Process claims).

7. Claims 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et al (US 2003/0012995) in view of Hata et al (US 6902790) as applied to claim 24 and 29 above, and further in view of Wallin et al (US 2002/0187389).

However, Hara et al as modified by Hata et al does not expressly teach at least one metal salt that is at least one of cerium nitrate, samarium nitrate, gadolinium nitrate,

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praseodymium nitrate, cerium chloride, samarium chloride, gadolinium chloride, praseodymium chloride, indium tin oxide, yttria stabilized zirconia, samarium strontium cobalt oxide, gadolinium doped ceria, or mixtures thereof; or at least one metal salt that is at least one of acetates, nitrates, halides, and sulfates of at least one of cerium, samarium, indium, gadolinium, praseodymium, yttrium, zirconium, strontium, and cobalt, or mixtures thereof. The Wallin reference discloses a cathode for a solid oxide fuel cell comprising praseodymium or samarium and yttria stabilized zirconia (See Abstract).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the disclosure of Wallin indicates that praseodymium and yttria stabilized zirconia are suitable materials for use as a cathode for solid oxide fuel cell. The selection of a known material based on its suitability for its intended use has generally been held to be *prima facie* obvious (MPEP §2144.07). As such, it would be obvious to use praseodymium and yttria stabilized zirconia.

8. Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et al (US 2003/0012995) in view of Hata et al (US 6902790), and further in view of Kearl et al (US 2002/0155335).

The Hara reference discloses a solid oxide fuel cell comprising: an air electrode layer "2a" operatively disposed in the fuel cell; and an electrolyte layer "3" in electrochemical contact with the air electrode layer; wherein the air electrode layer includes a lanthanum strontium manganese composite oxide established on a single crystal silicon substrate "4" by a liquid phase deposition method (See Figure 7A and

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paragraphs [0058]). Examiner's note: It is well known in the art that the air electrode in a solid oxide fuel cell is porous. For example, Hara et al discloses a SOFC comprising a porous air electrode "12" (See paragraph [0007]). Therefore, the pores of the air electrode layer are construed as microscopic cracks that enhance the surface area of the layer for one or more catalytic reactions in the fuel cell.

However, Hara et al does not expressly teach a water soluble polymer that is at least one of polyvinyl alcohol, starches, hydrocolloids, cellulose ethers, polyethylene oxides, polyacrylates, polyacrylamides, polyamines, polyimines, or mixtures thereof. The Hata reference discloses a ceramic sheet (electrode) that contains an organic binder such as acrylate-based or methacrylate based copolymers, vinyl alcohol based resins, or cellulose (See column 12, line 62 to column 13, line 27). It also discloses a proportion of the binder to the ceramic material that is preferably 5 to 30 parts by weight (See column 13, lines 61-62).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Hara electrode layer to include a water soluble polymer that is at least one of polyvinyl alcohol, cellulose ethers, polyacrylates, or mixtures thereof in order to increase the strength and flexibility of the electrode layer by utilizing an organic binder.

Examiner's note: It is noted that the instant claim is being construed as product-by-process and that the product itself does not depend on the process of making it. Accordingly, in a product-by-process claim, the patentability of a product does not depend on its method of production. In that, it is further noted that the product in the



instant claim is the same as or obvious over the product of the prior art. However, if the claim is not anticipated, the claim is obvious as it has been held similar products claimed in product-by-process limitations are obvious (In re Brown 173 USPQ 685 and In re Fessman 180 USPQ 324, See MPEP 2113: Product-by-Process claims).

However, Hara et al as modified by Hata et al does not expressly teach a substrate that is selected from alumina and sapphire. The Kearn reference discloses a substrate for a solid oxide fuel cell that is selected from alumina and sapphire (See paragraph [0084]).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the disclosure of Kearn indicates that alumina and sapphire are suitable materials for use as a substrate for solid oxide fuel cell. The selection of a known material based on its suitability for its intended use has generally been held to be *prima facie* obvious (MPEP §2144.07). As such, it would be obvious to use alumina and sapphire.

### ***Response to Arguments***

9. Applicant's arguments with respect to claims 24-33, 35-41, 49, and 50 have been considered but are moot in view of the new ground(s) of rejection.

The applicant argues that since Hata teaches that the ceramic sheet is designed and produced to avoid cracks, it is submitted that Hata teaches away from enhancing the surface area of the ceramic sheet for one or more catalytic reactions by forming one or more cracks in the sheet. As stated above, the Hara reference discloses pores in an

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air electrode layer that are construed as microscopic cracks that enhance the surface area of the layer for one or more catalytic reactions in the fuel cell. The Hata reference is relied upon for the teaching of adding an organic binder such as vinyl alcohol based resins to a ceramic sheet electrode. Therefore, the Hata reference does not teach away from enhancing the surface area of the ceramic sheet for one or more catalytic reactions by forming one or more cracks in the sheet.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571)272-0717. The examiner can normally be reached on M-F, 7:00AM to 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC

/PATRICK RYAN/  
Supervisory Patent Examiner, Art Unit 1795